

Claims

What is claimed is:

1. An implantable device for repairing a regurgitant cardiac valve having two or more leaflets and a subvalvular structure wherein at least one leaflet has a prolapsing segment, comprising:
a structure for attachment to the prolapsing leaflet, said structure defining a coaptation surface against which an opposing leaflet coapts during systolic contraction of the heart whereby the coaptation between the leaflets is normalized.
2. The device of claim 1 wherein said structure is rigid or semi-rigid.
3. The device of claim 1 wherein said structure is flexible.
4. The device of claim 1 wherein said structure is elastic.
5. The device of claim 1 wherein said structure has a proximal end configured for affixation to the prolapsing leaflet.
6. The device of claim 5 wherein said proximal end has a bifurcated configuration wherein a free margin of the prolapsing leaflet is positioned therein when said device is operatively affixed to the prolapsing leaflet.
7. The device of claim 1 wherein said structure has a distal end which extends freely beyond a free margin of the prolapsing leaflet when operatively implanted within the valve.
8. The device of claim 1 wherein said structure has a distal end configured for affixation to the subvalvular structure.
9. The device of claim 1 wherein said structure is substantially planar.

10. The device of claim 1 wherein said structure is curved or bowed.
11. The device of claim 10 wherein the curved structure defines an angle in the range from about 75° to less than 180°.
12. The device of claim 1 wherein said coaptation surface is configured to substantially mimic a normally function leaflet.
13. The device of claim 1 wherein said surface defines an area at least about 25 mm².
14. The device of claim 1 wherein said structure has a thickness in the range from about 2 mm to about 10 mm.
15. The device of claim 1 wherein said structure has a length in the range from about 5 mm to about 40 mm.
16. The device of claim 1 wherein the prolapsing leaflet also has a billowing section and wherein said surface has an area sufficient to immobilize the billowing section.
17. The device of claim 1 wherein the valve also has a dilated annulus resulting in a gap between the prolapsing leaflet and the opposing leaflet during systole and wherein a portion of said structure has a length sufficient to bridge the gap.
18. A system for repairing a regurgitant cardiac valve having two or more leaflets and a subvalvular structure wherein at least one leaflet has a prolapsing segment, comprising:
 - a structure configured for attachment to the prolapsing leaflet, said structure defining a coaptation surface against which an opposing leaflet coapts during systolic contraction of the heart wherein the coaptation between the leaflets is normalized;
 - a fixation means for attaching said structure to the prolapsing leaflet.

19. The system of claim 18 where said fixation means is selected from the group consisting of sutures, staples, clips, fasteners and glues.

20. A method for repairing a regurgitant cardiac valve having two or more leaflets and a subvalvular structure wherein at least one leaflet has at least one prolapsing segment, said method comprising the steps of:

providing a structure for attachment to the prolapsing leaflet, said structure defining a leaflet coaptation surface; and

implanting said structure at the regurgitant cardiac valve wherein, upon implantation, at least a portion of said structure extends between the two or more leaflets wherein a leaflet opposing said prolapsing leaflet coacts against said coaptation surface of said structure during systolic contraction of the heart whereby the coaptation between the two or more leaflets is normalized.

21. The method of claim 20 wherein said implanting comprises affixing said structure to said valve solely at said prolapsing leaflet.

22. The method of claim 21 wherein said structure is affixed to a top surface of said prolapsing leaflet thereby covering at least a portion of said top surface.

23. The method of claim 21 wherein said structure is affixed to an underside of said prolapsing leaflet.

24. The method of claim 21 wherein said affixing is accomplished by means of applying one or more selected from the group consisting of sutures, staples, clips, fasteners and glues.

25. The method of claim 21 wherein said affixing comprises affixing a proximal end of said structure to said prolapsing leaflet.

26. The method of claim 25 further comprising the step of affixing a distal end of said structure at a location on the subvalvular structure.

27. The method of claim 20 wherein said implanting comprises substantially immobilizing said at least one prolapsing segment.

28. The method of claim 20 further comprising maintaining a single orifice of said valve upon implanting said structure.

29. The method of claim 20 wherein the prolapsing leaflet has two prolapsing segments, said method further comprising implanting a second one of said structure in said valve.

30. The method of claim 29 wherein said first structure is affixed to the prolapsing leaflet at the first prolapsing segment and said second structure is affixed to the prolapsing leaflet at the second prolapsing segment.

31. The method of claim 20 wherein two of the leaflets have at least one prolapsing segment each, said method further comprising implanting a second one of said structure in said valve.

32. The method of claim 31 wherein said first structure is affixed to a first prolapsing leaflet and said second structure is affixed to a second prolapsing leaflet

33. The method of claim 20 wherein said implanting is performed percutaneously.

34. The method of claim 33 wherein said percutaneous implanting comprises using a catheter to deliver said structure to the valve to be repaired.

35. The method of claim 34 further comprising compressing said structure for delivery through said catheter.

36. The method of claim 35 further comprising expanding said structure upon delivery to the valve to be repaired.

37. The method of claim 20 wherein said cardiac valve is the mitral valve.

38. The method of claim 20 wherein the prolapsing leaflet also has a billowing section and wherein said implanting immobilizes the billowing section.

39. The method of claim 20 wherein the valve also has a dilated annulus resulting in a gap between the prolapsing leaflet and the opposing leaflet during systole and wherein said portion of said implanted structure extending between said leaflets bridges the gap.

40. The method of claim 20 wherein the structure contacts at least about 50% of the prolapsing segment.

41. A method for repairing a regurgitant cardiac valve having two or more leaflets and a subvalvular structure wherein at least one leaflet has at least one prolapsing segment, said method comprising the steps of:

providing a structure for attachment to the prolapsing leaflet, said structure defining a leaflet coaptation surface and an undersurface;

affixing said structure to the prolapsing leaflet wherein the undersurface of said structure overlies the prolapsing segment; and

extending at least a portion of said structure between the two or more leaflets wherein a leaflet opposing said prolapsing leaflet coacts against said coaptation surface of said structure during systolic contraction of the heart whereby the coaptation between the two or more leaflets is normalized.

42. The method of claim 41 further comprising affixing said structure at a location on the subvalvular structure.